

WHAT IS CLAIMED IS:

1. A high sensitivity receiver comprising  
reception bandpass filter means for receiving a radio frequency  
signal as an input and for passing a signal in a desired frequency band;  
5 a low noise reception amplifier for providing low noise  
amplification of an output signal from the reception bandpass filter means to a  
desired level;  
a laser diode for converting an output signal from the low noise  
reception amplifier to an optical signal to be delivered;  
10 a heat shielding box for confining the reception bandpass filter  
means, the low noise reception amplifier and the laser diode therein;  
and a cooling means for cooling the interior of the heat shielding  
box.
2. A high sensitivity receiver according to Claim 1, in which the  
15 reception bandpass filter means, the low noise reception amplifier and the  
laser diode are divided into  $s$  groups and the cooling means includes  $s$  cooling  
units each cooling one of the groups where  $s$  is one of 1, 2 or 3.
3. A high sensitivity receiver according to Claim 1, further  
comprising  
20 an array antenna formed by  $n$  antenna elements where  $n$  is an  
integer equal to or greater than 2;  
and a phase shifter synthesizer for receiving received signals from  
the  $n$  antenna elements, adjusting phase differences between the received  
signals and synthesizing them to deliver a synthesized output as said radio  
25 frequency signal.
4. A high sensitivity receiver according to Claim 3 in which the  
phase shifter synthesizer is disposed within the heat shielding box to be

cooled.

5. A high sensitivity receiver according to Claim 1, further comprising

an array antenna formed by  $n$  antenna elements where  $n$  is an  
5 integer equal to and greater than 2;

and a phase shifter for receiving received signals from the  $n$  antenna elements as inputs and for adjusting phase differences between the received signals to deliver  $n$  signals;

said radio frequency signal being  $n$  output signals from the phase  
10 shifter, which are input to the reception bandpass filter means which comprises  $n$  filters for passing signals in desired frequency bands;

said low noise reception amplifier including  $n$  amplifiers, into which the  $n$  filter output signals are input respectively;

and a synthesizer for synthesizing output signals from the  $n$   
15 amplifiers to provide an input to the laser diode;

the phase shifter and the synthesizer being disposed within the heat shielding box to be cooled.

6. A high sensitivity receiver according to Claim 5 in which the reception phase shifter, the reception bandpass filter means, the low noise  
20 reception amplifier, the synthesizer and the laser diode are divided into  $s$  groups and the cooling means includes  $s$  cooling units each cooling one of the groups where  $s$  is one of 1, 2, 3, 4 or 5.

7. A high sensitivity receiver according to Claim 1, further comprising

25 an array antenna formed by  $n$  antenna elements where  $n$  is an integer equal to or greater than 2;

said radio frequency signal being signals received by the  $n$  antenna

elements, the reception bandpass filter means comprising  $n$  filters each receiving a radio frequency signal received by one of  $n$  antenna elements for passing a signal in a desired frequency band, the low noise reception amplifier including  $n$  amplifiers, to which outputs from the  $n$  filters are fed;

5                   and a phase shifter synthesizer for receiving output signals from the  $n$  amplifiers as inputs and for adjusting phase differences between these output signals and for synthesizing the output signals to be input to the laser diode.

8.   A high sensitivity receiver according to Claim 7 in which the  
10   reception bandpass filter means, the low noise reception amplifier, the phase shifter synthesizer and the laser diode are divided into  $s$  groups and the cooling means includes  $s$  cooling units each cooling one of the groups where  $s$  is one of 1, 2, 3 or 4.

9.   A high sensitivity receiver according to Claim 1 in which the  
15   cooling means includes a cooling unit formed by a cooling plate and at least one other cooling unit formed by a cooling plate in combination with a heat resistance member for cooling one or more of the reception bandpass filter means, the low noise amplifier and the laser diode to mutually different temperatures.

20               10.   A high sensitivity receiver according to Claim 1 in which said cooling means includes a plurality of cooling means, each of which cools one or two of the reception bandpass filter means, the low noise reception amplifier and the laser diode to mutually different temperatures.

11.   A high sensitivity receiver according to Claim 1 in which said  
25   cooling means includes a plurality of cooling unit formed by a cooling member, each of which cools one or more of the reception bandpass filter means, the low noise reception amplifier and the laser diode to mutually

different temperatures.

12. A high sensitivity receiver according to Claim 1, further comprising

5 a power distributor connected between the low noise reception amplifier and the laser diode for branching part of the signal which is input to the laser diode;

and a bias current control means for controlling a bias current supplied to the laser diode in accordance with the power level of the signal which is branched by the power distributor.

10 13. A high sensitivity receiver according to Claim 1, further comprising

a pilot signal generator preceding the laser diode for generating a pilot signal which is to be added to said radio frequency signal;

15 an optical/electrical transducer for transducing the optical signal into an electric signal;

a branching filter for selecting the pilot signal from an electrical output signal from the optical/electrical transducer;

a level detector for detecting the level of the pilot signal which is filtered by the branching filter;

20 and a monitor for comparing the level of the detected pilot signal against a preset threshold to detect the occurrence of a fault in at least the laser diode.